
Type Acceptance Report

TAR 13/21B/21

WACO Classic YMF (F5 Series)

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Executive Summary

New Zealand Type Acceptance has been granted to the Waco Classic Aircraft Corporation YMF (F5/F5C) Series based on validation of FAA Approved Type Certificate number 542. There are no special requirements for import.

Applicability is currently limited to the Models and/or serial numbers detailed in Appendix 1, which are now eligible for the issue of an Airworthiness Certificate in the Standard Category in accordance with NZCAR §21.191, subject to any outstanding New Zealand operational requirements being met. (See Section 5 of this report for a review of compliance of the basic type design with the operating Rules.) Additional variants or serial numbers approved under the foreign type certificate can become type accepted after supply of the applicable documentation, in accordance with the provisions of NZCAR §21.43(c).

1. Introduction

This report details the basis on which Type Acceptance Certificate No. 13/21B/21 was granted in the Standard Category in accordance with NZCAR Part 21 Subpart B.

Specifically the report aims to:

- (a) Specify the foreign type certificate and associated airworthiness design standard used for type acceptance of the model(s) in New Zealand; and
- (b) Identify any special conditions for import applicable to any model(s) covered by the Type Acceptance Certificate; and
- (c) Identify any additional requirements which must be complied with prior to the issue of a NZ Airworthiness Certificate or for any subsequent operations.

2. ICAO Type Certificate Details

Manufacturer:	Classic Aircraft Corporation WACO Classic Aircraft Corporation (since 25.03.97) (PC 328CE first issued 07.09.89)
Type Certificate Holder:	Waco Aircraft Company (The FAA TCDS states ownership of the Type Certificate was transferred to the public domain when the Waco Aircraft Company ceased to exist. It was cancelled in September 1939, but re-instated in March 1986.)
Type Certificate:	ATC 542
Issued by:	Federal Aviation Administration
STC:	SA1000GL

Model(s): YMF (WACO F5, WACO F5C)

MCTOW 2650 lb. [1202 kg.] (F5 s/n F5001 through F5009)
2770 lb. [1256 kg.] (F5 s/n F5010 through F5036)
2950 lb. [1338 kg.] (F5C s/n F5C040 and up)

Max. No. of Seats: 3

Noise Standard: FAR Part 36 Appendix G

Engine: Jacobs R-755B2 or B2M (245 hp @ 2050 RPM)
(275 hp @ 2200 RPM)
Jacobs R-755A2 or A2M (300 hp @ 2200 RPM – F5C)
Type Certificate: E-237
Issued by: Federal Aviation Administration

Propeller: Sensenich W90T6J or W96J Series
Type Certificate: P-170
Issued by: Federal Aviation Administration

Hamilton Standard 2B20/6135-15
Type Certificate: P-255
Issued by: Federal Aviation Administration

MT-Propeller MT 233 R 150-6AJ (S/N F5010 and up)
Type Certificate: P.006
Issued by: European Aviation Safety Agency

3. Type Acceptance Details

The application for New Zealand type acceptance was from the manufacturer, dated 26 February 2013. The first-of-type example was F5 serial number F5019 registered ZK-CFL. The WACO Classic F5 is a single radial engine, fixed undercarriage tailwheel biplane with metal-covered steel tube fuselage and fabric-covered wooden wings.

Type Acceptance Certificate No. 13/21B/21 was granted on 10 April 2013 to the WACO Classic YMF (Models F5 and F5C) based on validation of FAA Type Certificate number ATC 542 and Supplemental Type Certificate number SA1000GL, and includes the Jacobs R-755A/B Series engine based on FAA Type Certificate E-237. Specific applicability is limited to the coverage provided by the operating documentation supplied. There are no special requirements for import into New Zealand.

The WACO Classic Model YMF is an unusual situation. While it is a modernised version of an original pre-war aircraft, because there was no current type certificate to transfer or revise the updated versions known as the F5 and F5C are effectively defined by the associated STC. The five principal areas where changes were made, as listed on the TCDS, were: throttle control; wheels and brakes; electrical and starting system; steerable tailwheel; and engine and propeller. The changes were brought about by either: unavailability of the original materials or components; lack of definition of the original Waco design; product improvement (for example use of 4130 steel tubing with internal corrosion treatment); manufacturing process changes; or regulatory requirements.

The aircraft has undergone a number of changes during production. From serial number F5010 through F5036 the gross weight was increased to 2770 lb along with an associated increase in engine rating to 275 hp. From serial number F5C040 onwards (Model F5C marketed as the YMF Super) the gross weight was increased to 2950 lb. The fuselage was also lengthened 6 inches to increase cockpit size and fit a larger passenger door. From 2010 a 300 hp engine became optional, which is marketed as the YMF-5D.

4. NZCAR §21.43 Data Requirements

The type data requirements of NZCAR Part 21B Para §21.43 have been satisfied by supply of the following documents, or were already held by the CAA:

(1) ICAO Type certificate:

- FAA Type Certificate Data Sheet no. ATC 542 at Rev. 2 dated October 26, 2010
 - Model YMF approved prior to September 30, 1939
 - Model YMF (WACO F5 Modification) approved March 10, 1986
 - Model YMF (WACO F5 Mod. Increased MAUW) approved Jan 28, 1988
 - Model YMF (WACO F5C Modification) approved June 24, 1991

(2) Airworthiness design requirements:

(i) *Airworthiness Design Standards:*

The certification basis of the original Waco YMF was the Aeronautics Bulletin 7A effective as amended January 1, 1933. This was retained for the STC for the WACO F5 modifications under STC SA1000GL. This is an acceptable certification basis in accordance with NZCAR Part 21B Paragraph §21.41 and Advisory Circular 21-1A, because Aero Bulletin 7 was the predecessor of CAR 3, which was itself superseded by FAR 23, which is the basic standard for Normal Category Airplanes called up under Part 21 Appendix C. There are no non-compliances and no additional special conditions have been prescribed by the Director under §21.23.

The certification basis of the Jacobs Model R-755A2 was CAR 13 effective August 1, 1941. This was updated to include Amendment 13-2 for the Model R-755B2, and Amendment 13-3 for the Models R-755B2M and R-755A2M. CAR 13 is the predecessor to FAR Part 33, which is the basic standard for aircraft engines called up under Part 21 Appendix C.

(ii) *Special Conditions:*

Nil

(iii) *Equivalent Level of Safety Findings:*

Nil

(iv) *Airworthiness Limitations:*

Nil

(3) Aircraft Noise and Engine Emission Standards:

(i) *Environmental Standard:*

The Model YMF has been certificated under FAR Part 36, including Amendments 36-1 through 36-12 for the F5, and through 36-18 for the F5C.

(ii) *Compliance Listing:*

Report CLA/CL-2 – F.A.R.36 Fly-Over Noise Tests and Substantiation for Waco Classic YMF-5 with 99-IN. and 96-IN. Metal Propeller (275 and 245 H.P.) and with 90-IN. Wooden Propeller (275 H.P.)

Noise Test Report JM91-3 dated June 5-91 – Classic Waco F5C (2950 lbs. G.W.) with Sensenich propeller installations

The flyover noise level established in compliance with FAR Part 36 for the WACO F5 (See the AFM Section II.J) is:

1. W90T6JB72 (Fixed Pitch Prop) 79.95 dB(A)
2. W96JB-4-68 (Fixed Pitch Prop) 79.42 dB(A)

The flyover noise level established in compliance with FAR Part 36 for the WACO F5C (See the AFM Section II.J) is as follows:

3. Standard Fixed Pitch Propeller Sensenich W96JB-4-68 79.42 dB(A)
4. Optional Fixed Pitch Propeller MT 233R 150-6AJ 79.42 dB(A)
5. Optional Constant Speed Propeller Hamilton Standard 2B20 75.96 dB(A)

(4) Certification Compliance Listing:

Report F5-CS – Compliance Summary of the Classic Waco YMF

(5) Flight Manual:

FAA Approved Airplane Flight Manual WACO Classic Aircraft – Model YMF WACO F5 – Report No. 86-AFM1 – CAA Accepted as AIR 3242

FAA Approved Airplane Flight Manual WACO Classic Aircraft – Model YMF WACO F5C – Report No. 91-AFM1 – CAA Accepted as AIR 3243

(6) Operating Data for Aircraft, Engine and Propeller:

(i) *Maintenance Manual:*

YMF WACO F5 Series Maintenance Manual – Publication YMFAMM-1

Operator's Manual – Jacobs Aircraft Engine Models R-755A, R-755B and R-755S
Overhaul Manual – Jacobs Aircraft Engine Models R-755A, R-755B and R-755S

(ii) *Current service Information:*

WACO Classic Service Letters and Service Bulletins

(iii) *Illustrated Parts Catalogue:*

IPC not currently available for the aircraft

Parts Catalogue – Jacobs Aircraft Engine Models R-755A and R-755B

(7) Agreement from manufacturer to supply updates of data in (5), and (6):

CAA 2171 Form from WACO-CAC General Manager dated 26/02/2013

(8) Other information:

Model YMF WACO F5 – Pilot's Information Manual – Performance Information

Model YMF WACO F5C – Pilot's Information Manual – Performance Information

5. Additional New Zealand Requirements

Compliance with the retrospective airworthiness requirements of NZCAR Part 26 has been assessed as they are a prerequisite for the grant of an airworthiness certificate.

CAR Part 26 – Subpart B – Additional Airworthiness Requirements

Appendix B – All Aircraft

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
B.1	Marking of Doors and Emergency Exits	<i>To be determined on an individual aircraft basis</i>
B.2	Crew Protection Requirements – CAM 8 Appdx. B # .35	Not Applicable – Agricultural Aircraft only

Compliance with the following additional NZ operating requirements has been reviewed and were found to be covered by either the original certification requirements or the basic build standard of the aircraft, except as noted:

CAR Part 91 – Subpart F – Instrument and Equipment Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
91.505	Seating and Restraints – Safety belt/Shoulder Harness	WACO Classic YMF approved for aerobatic manoeuvres Shoulder harness fitted as standard in front & rear cockpits *
91.507	Pax Information Signs – Smoking, safety belts fastened	Not Applicable – Less than 10 passenger seats
91.509 Min. VFR	(1) ASI (2) Machmeter (3) Altimeter (4) Magnetic Compass (5) Fuel Contents (6) Engine RPM (7) Oil Pressure	Fitted as standard * Not Applicable Fitted as standard * Fitted as standard * Fitted as standard * Fitted as standard * Fitted as standard *
91.511	Night VFR Instruments and Equipment	<i>Operational Requirement – Compliance as applicable</i>
91.513	VFR Communication Equipment	<i>Operational Requirement – Compliance as applicable</i>
91.517	IFR Instruments and Equipment	<i>Operational Requirement – Compliance as applicable</i>
91.519	IFR Communication and Navigation Equipment	<i>Operational Requirement – Compliance as applicable</i>
91.523	Emergency Equipment: (a) More Than 9 pax – First Aid Kits per Table 7 – Fire Extinguishers per Table 8 (b) More than 20 pax – Axe readily accessible to crew (c) More than 61 pax – Portable Megaphones per Table 9	Not Applicable – Less than 10 passenger seats Not Applicable – Less than 10 passenger seats Not Applicable – Less than 20 passenger seats Not Applicable – Less than 61 passenger seats
91.529	ELT - TSO C126 406 MHz after 22/11/2007	<i>Operational Requirement – Compliance as applicable</i>
91.531	Oxygen Indicators - Volume/Pressure/Delivery	<i>Operational Requirement – Compliance as applicable</i>
91.533	Oxygen for unpressurised aircraft	<i>Operational Requirement – Compliance as applicable</i>
91.541	SSR Transponder and Altitude Reporting Equipment	<i>Operational Requirement – Compliance as applicable</i>
91.543	Altitude Alerting Device - Turbojet or Turbofan	Not Applicable – Not turbo jet or turbofan powered
91.545	Assigned Altitude Indicator	<i>Operational Requirement – Compliance as applicable</i>
A.15	ELT Installation Requirements	<i>To be determined on an individual aircraft basis</i>

CAR Part 135 – Subpart F – Instrument and Equipment Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
135.355	Seating and Restraints – Shoulder harness flight-crew seats	<i>Operational Requirement – Compliance as applicable</i>
135.357	Additional Instruments (Powerplant and Propeller)	Fitted as standard *
135.359	Night Flight	Landing light, Pax compartment
135.361	IFR Operations	Speed, Alt, spare bulbs/fuses
135.363	Emergency Equipment (Part 91.523 (a) and (b))	<i>Operational Requirement – Compliance as applicable</i>
135.367	Cockpit Voice Recorder	N/A – Only for 2-crew helicopters with more than 10 pax
135.369	Flight Data Recorder	Not Applicable – Less than 10 passenger seats
135.371	Additional Attitude Indicator	Not Applicable – Not turbo jet or turbofan powered

* See AFM Section IV Weight and Balance – Equipment List

Attachments

The following documents form attachments to this report:

- Photographs first-of-type example WACO Classic YMF s/n F5019 ZK-CFL
- Three-view drawing Waco YMF (Classic Aircraft Model F5)
- Copy of FAA Type Certificate Data Sheet Number ATC 542

Sign off

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David Gill
Team Leader Airworthiness

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Checked – Peter Gill
Airworthiness Engineer

Appendix 1

List of Type Accepted Variants:

<i>Model:</i>	<i>Applicant:</i>	<i>CAA Work Request:</i>	<i>Date Granted:</i>
YMF (F5, F5C)	WACO Classic Aircraft Corp.	13/21B/21	10 April 2013